

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



S37953

(43) International Publication Date
1 July 2004 (01.07.2004)

PCT

(10) International Publication Number
WO 2004/055893 A1

(51) International Patent Classification⁷: H01L 23/525(21) International Application Number:
PCT/IB2003/005905(22) International Filing Date:
13 December 2003 (13.12.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/434,136 16 December 2002 (16.12.2002) US

(71) Applicant (for all designated States except US): KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventors; and

(75) Inventors/Applicants (for US only): DONDERO, Richard [US/US]; 1109 McKay Drive, M/S-41SJ, San Jose, CA 95131 (US). TROTTER, Doug [US/US]; 1109 McKay Drive, M/S-41SJ, San Jose, CA 95131 (US).

(74) Common Representative: KONINKLIJKE PHILIPS ELECTRONICS N.V.; c/o LESTER, Shannon, 1109 McKay Drive, M/S-41SJ, San Jose, CA 95131 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

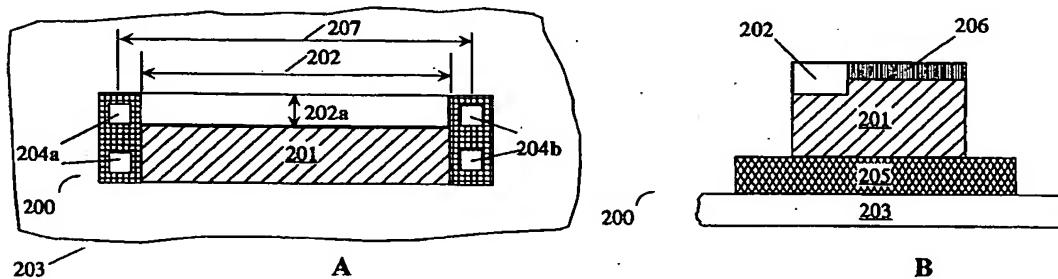
— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

Published:

— with international search report

[Continued on next page]

(54) Title: POLY-SILICON STRINGER FUSE



(57) Abstract: A polysilicon silicide stringer fuse is constructed having a narrow width by using an overlay tolerance of the photo stepper tool instead of the minimum critical dimension tolerance of the stepper tool. In an example embodiment, a fuse (200) for integration within a semiconductor comprises depositing an insulating layer (205) adjacent to the semiconductor substrate (203). A silicon layer (201) is formed with a first silicon material having a first resistance deposited adjacent the insulating layer (205). The silicon layer has a first width. A metal silicide stringer (202), having a second resistance different from the first resistance is deposited over a portion of the first silicon material (201) and having a second width that is less than the first width within at least a portion thereof. The metal silicide conducts current therethrough with approximately the second resistance and agglomerates in response to a programming current other than the conduct current therethrough with a same second resistance.

WO 2004/055893 A1

WO 2004/055893 A1



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International **Ication No**
PCT/IB 03/05905

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 HO1L23/525

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 HO1L G11C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 445 317 A (MOTOROLA INC) 11 September 1991 (1991-09-11) abstract; claims; figures 1-4 column 3, line 5 - line 10 column 3, line 32 - line 46 ---	21
Y	US 4 984 054 A (YAMADA MICHIIRO ET AL) 8 January 1991 (1991-01-08) abstract; claims; figures 5-13 column 5, line 30 - line 47 column 6, line 40 - line 47 ---	1,2,5-8
Y	US 4 984 054 A (YAMADA MICHIIRO ET AL) 8 January 1991 (1991-01-08) abstract; claims; figures 5-13 column 5, line 30 - line 47 column 6, line 40 - line 47 ---	1,2,5-8
	-/-	-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the International filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the International filing date but later than the priority date claimed

- *T* later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

24 February 2004

Date of mailing of the International search report

01/03/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Werner, C

INTERNATIONAL SEARCH REPORT

International	cation No
PCT/IB 03/05905	

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 271 574 B1 (REVIL NATHALIE ET AL) 7 August 2001 (2001-08-07) abstract; claims; figures 5-9 column 2, line 33 - line 52 column 3, line 54 -column 4, line 2 column 6, line 31 - line 33 ----	21
A	US 6 368 902 B1 (IYER SUNDAR KUMAR ET AL) 9 April 2002 (2002-04-09) abstract; claims; figures 2,3B,5,6 column 5, line 27 - line 35 ----	1,9,21
A	US 5 854 510 A (SUR JR HARLAN LEE ET AL) 29 December 1998 (1998-12-29) abstract; claims; figures 5A,6-13 ----	1,9,21

INTERNATIONAL SEARCH REPORT

International application No PCT/IB 03/05905

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
EP 0445317	A	11-09-1991	US EP JP KR	5011791 A 0445317 A1 2265259 A 146284 B1	30-04-1991 11-09-1991 30-10-1990 02-11-1998
US 4984054	A	08-01-1991	JP	63140550 A	13-06-1988
US 6271574	B1	07-08-2001	FR DE EP EP	2778791 A1 69900484 D1 1103858 A2 0957403 A1	19-11-1999 10-01-2002 30-05-2001 17-11-1999
US 6368902	B1	09-04-2002	DE EP JP TW WO	10125407 A1 1285463 A2 2002057217 A 518735 B 0193331 A2	20-12-2001 26-02-2003 22-02-2002 21-01-2003 06-12-2001
US 5854510	A	29-12-1998	US US DE FR GB JP	5976943 A 5882998 A 19756833 A1 2758007 A1 2320804 A 10199712 A	02-11-1999 16-03-1999 02-07-1998 03-07-1998 01-07-1998 31-07-1998